

1 beam path to a solid phase. In contrast, my invented apparatus comprises a liquid
dispensing device to dispense small **liquid droplets** (not organic vapor) in a highly
controllable manner onto a target surface and a laser beam is not necessarily required in
my apparatus. In my apparatus, the droplet sizes are controlled by the nozzle orifice size
and the impending liquid chamber pressure. By contrast, the deposited solid phase size in
6 Jang and Yang's apparatus depends upon the laser beam size. These differences can be
understood from claim 1 of Jang and Yang's patent and claim 32 of my application,
shown respectively in the following:

Jang and Yang (US 6,180,049):

11 1. Solid freeform fabrication apparatus for making a three-dimensional object,
comprising:
(a) a target surface;
(b) a material deposition sub-system comprising
a fluid phase delivery device, disposed a distance from said target surface, said device
16 comprising (1) a phase change chamber having a discharge opening of a predetermined
size smaller than 1 mm in diameter on one side of said chamber proximal said target
surface, (2) a multiplicity of flow channels with each channel having first and second
ends, said first end being supplied with a precursor fluid phase composition and said
second end having an orifice of a predetermined size to supply said fluid phase
21 composition therethrough into said phase change chamber, and (3) flow control means
located in control relation to each of said channels for regulating the flow of said fluid
phase composition through said orifice into said phase chamber and then dispensing said
fluid phase composition through said discharge opening; said dispensed fluid phase
composition moving from said opening toward said target surface, forming a narrow
26 travel path;
a focused energy beam, disposed a distance from said fluid phase delivery device, and
operative to intersect said travel path producing a phase change zone in which said fluid
phase composition undergoes a chemical reaction and/or physical transition for
depositing materials onto said target surface;

1 (c) motion devices coupled to said target surface and said material deposition sub-system
for moving said deposition sub-system and said target surface relative to one another
along selected directions in a plane defined by first and second coordinate directions and
in a third coordinate direction orthogonal to said plane to form said deposition materials
into a three-dimensional shape.

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In my application:

11 32. A direct write apparatus for fabricating a desired circuit component onto a substrate
surface of a microelectronic device according to a computer-aided design (CAD), said
apparatus comprising:

- 16 (a) a support member for supporting thereon said device substrate;
- (b) a fluid material delivery assembly comprising a chamber at a distance from said
support member for containing a precursor fluid material under a substantially
constant but adjustable pressure differential relative to the ambient pressure;
- 21 (c) an inkjet-based dispensing head in flow communication with said chamber, said
head comprising on one end at least a discharge orifice of a predetermined size
and a valve means in control relation to said at least a discharge orifice for
dispensing droplets of said precursor fluid material through said orifice onto said
substrate surface; and
- 26 (d) machine control means in electronic communication with a computer and in
control relation to both said support member and said dispensing head for
generating control signals in response to coordinates of said design of the device
and for controlling the position of said dispensing head relative to said support
member in response to said control signals to control dispensing of said precursor
material for fabricating said component.
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As one can see, the above two claims from two respective inventions are so vastly different.
Those skilled in the art would not have anticipated one from another.

1 (B) It is well-known in the field of solid freeform fabrication (SFF) or direct write (DW)
technology that a typical 3-D fabrication or direct write apparatus comprises a material
delivery device, a support member (target surface), and a motion control system. Any
difference between two apparatus is almost always related to how the object- or
component-forming material is delivered and deposited at a desired spot. It is true that
6 both my apparatus and Jang and Yang's apparatus have a material delivery device, a
support member (target surface), and a motion control system. However, this is the only
similarity between the two apparatus in question. In my apparatus, I had to design an
intricate liquid dispensing device to eject liquid droplets out of a nozzle orifice at a
constant pressure differential to ensure consistent particle sizes and droplet formation
11 rates. In my apparatus, a constant pressure differential is the key to the success of the
apparatus and the related process for building a 3-D object. By contrast, Jang and Yang
used a phase-change chamber to somehow confine an organic vapor in this chamber,
which can be smaller or bigger since the deposit solid phase size is controlled by the laser
beam size, not by the chamber size. Indeed, a material delivery and deposition sub-system
16 was typically what distinguished one SFF or DW system from another according to the
patent literature published in the last 15 years.

(2) The Office Action further stated that "Claims 33-38 and 41-42 objected to as being
dependent upon a rejected base claim, but would be allowable if re-written in independent form
including all of the limitations of the base claim and any intervening claims." Since claim 32 now
21 appears to be allowable, claims 33-38 and 41-42 are also allowable.

(3) Since claim 32 now appears to be allowable, claims 39 and 40 (which depend upon claim 32)
should also be allowable. It may be noted that claims 39 and 40 provide a roll-to-roll capability of
mass-producing desired active, passive, and other functional components to make an integrated
circuit (IC) or a micro-electronic device such as a sensor, actuator, or micro-electro-mechanical
26 system (MEMS). Without a mass production capability, it would be difficult for an IC or MEMS
product to be market-competitive. The apparatus of Jang and Yang did not contain such a highly
desirable feature.

1 Your favorable consideration of this request shall be greatly appreciated.

Respectfully submitted,

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